

# Exhibit 4.1

**Harman Kardon – Soundbar****(See Accused Product List at end of chart for soundbar models)****Infringement of the '430 patent****Claim #2**

2. A speaker system for producing localized regions of sound comprising:

**Evidence**

The Harman Kardon soundbar is a speaker system for producing localized regions of sound.

For example, the soundbar produces a surround sound effect. The surround sound effect causes a listener facing the soundbar to perceive that sound emanating from the soundbar is originating at a location behind and to the left of the listener, referred to as surround left, and at another location behind and to the right of the listener, referred to as surround right.



[1]

	<div data-bbox="1129 159 1199 212" data-label="Image"></div> <div data-bbox="1444 203 1528 261" data-label="Image"></div> <p data-bbox="873 269 1453 337"><b>EXCLUSIVE HARMAN DISPLAY VIRTUAL SURROUND SOUND</b></p> <p data-bbox="810 362 1516 500"><u>The SB26 delivers Harman Display virtual surround sound – enveloping you in a level of immersive sonic realism such as you’ve only experienced at the multiplex, and giving you a top class movie experience at home.</u></p> <p data-bbox="1556 540 1602 573">[1]</p> <p data-bbox="800 581 1234 613"><b>MultiBeam™ Surround Sound</b></p> <div data-bbox="1262 586 1388 613" data-label="Image"></div> <p data-bbox="800 618 1671 756"><u>Get a room-filling surround sound effect without the need for extra speakers and wires.</u> MultiBeam™ technology creates a wider soundstage, so you’ll hear every audio detail in your favorite music, movies, TV series and games.</p> <p data-bbox="1692 740 1738 773">[4]</p> <p data-bbox="800 781 1310 813"><b>Wireless cinematic surround sound</b></p> <p data-bbox="800 818 1661 992"><u>Get a rich surround sound effect with the convenience of a single soundbar.</u> Or create a full 5.1 home theater system with WiSA technology for the ultimate true surround sound experience by adding a pair of Harman Kardon Citation Surround speakers, a Harman Kardon Citation Sub S or pair of Harman Kardon Citation Tower speakers.</p> <p data-bbox="1682 976 1728 1008">[4]</p>
<p data-bbox="201 1016 720 1081">a multiplicity of audio frequency speakers;</p>	<p data-bbox="783 1016 1766 1081">The Harman Kardon soundbar includes a multiplicity of audio frequency speakers.</p> <p data-bbox="783 1122 1751 1195">For example, the soundbar includes multiple audio speakers positioned along a front face of the soundbar.</p>



## POWERFUL 2-CHANNEL AMPLIFICATION AND A 100W BASS REFLEX SUBWOOFER

With its 4 woofers, 2 tweeters and outstanding 100W wireless subwoofer, the HARMAN KARDON SB26 delivers as much show-stopping power as any elaborate home theater sound system available.

[1]



[3]

### Specifications:

- Model Name: Citation MultiBeam™ 700
- Transducer: 2 x 25mm tweeter, 5 x 50mm woofer
- Output power: 210W RMS
- Signal-to-noise ratio: >80dB
- Power Supply: 100-240V~50/60Hz
- Power consumption in sleep mode: <2.0 Watts
- Bluetooth® version: 4.3

[4]

at least one defined sound target spaced from each of the speakers of the multiplicity of speakers,

The Harman Kardon soundbar has at least one defined sound target spaced from each of the speakers of the multiplicity of speakers. Each speaker has a means for applying a time varying audio drive

wherein each speaker has a means for applying a time varying audio drive voltage which is substantially identical, except that each audio drive voltage is offset in time by an amount which is related to the distance between each speaker and the defined sound target, so that substantially identical sound from each speaker reaches the sound target at the same time;

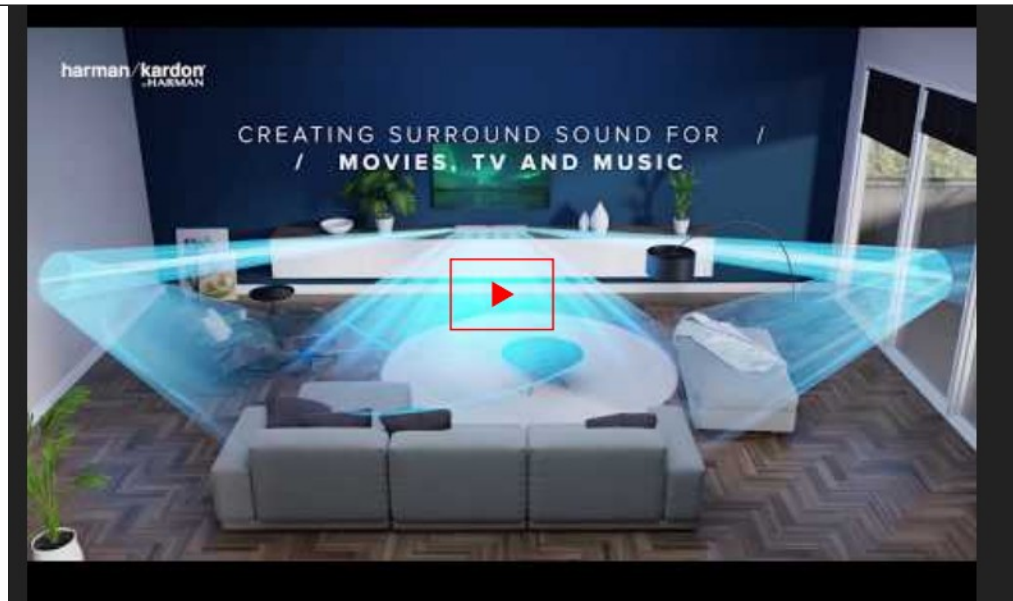
voltage which is substantially identical, except that each audio drive voltage is offset in time by an amount which is related to the distance between each speaker and the defined sound target. So that substantially identical sound from each speaker reaches the sound target at the same time.

For example, each of the speakers is connected to an audio amplifier. A surround left channel signal is provided to each speaker via the speaker's respective amplifier. The surround left channel is delayed slightly for speakers on the listener's left compared to speakers on the listener's right. The amount of delay is such that sound waves emanating from each of the speakers reaches the surround left location at the same time, thereby interfering constructively to produce a resultant sound wave having a peak spatial amplitude at the surround left location. When this wave reflects back to the listener, the listener perceives that the sound originated from the surround left location. [A]

#### **Surround Processing**

- Harman Display Surround Virtual Speaker surround mode creates a complete surround sound experience without any extra speakers or wires
- Two-channel stereo mode for traditional stereo playback
- Dolby® Digital Decoding
- Harman Volume helps you maintain the same volume level, no matter what you're watching - be it a film, TV show or TV commercial

[2]



[3]

[2]

**According to the specification the term: “substantially identical” means:**

“It should be understood that when, a means for applying a time varying audio drive voltage, i.e. the signal used to drive individual speakers is described as substantially identical, the signals are defined as being substantially identical, although they vary in amplitude. The term, substantially identical, means capable of constructive interference when used in the sound system 36 of this invention.” [col.12 lines 18-24]

at least a first defined sound target and a second defined sound target, the second sound target being spaced from the first sound target, and the first sound target and the second sound target being spaced from each of

The Harman Kardon soundbar has at least a first defined sound target and a second defined sound target. The second sound target is spaced from the first sound target. The first sound target and the second sound target are spaced from each of the speakers.

For example, the surround left location is at a rear position on a left-side wall of a nominally sized room e.g. 10 ft x 15 ft. The surround

the speakers of the multiplicity of speakers,

right location is at a rear position on the right-side wall of the room.

Elegant, dynamic and powerful. The Harman Kardon Citation MultiBeam™ 700 delivers full surround sound to your TV without the need for extra speakers and wires. As a standalone soundbar, it projects rich audio to every corner of the room. Plus, you can control the experience using just your voice, with help from the Google Assistant. When paired with the rest of the Citation range, the Citation MultiBeam 700 can also operate as a center channel to create the ultimate home theater setup for full, detailed surround sound. Enjoy more than 300 music streaming services with the convenience of AirPlay and Chromecast built-in. Experience beautiful sound, no matter how you listen.

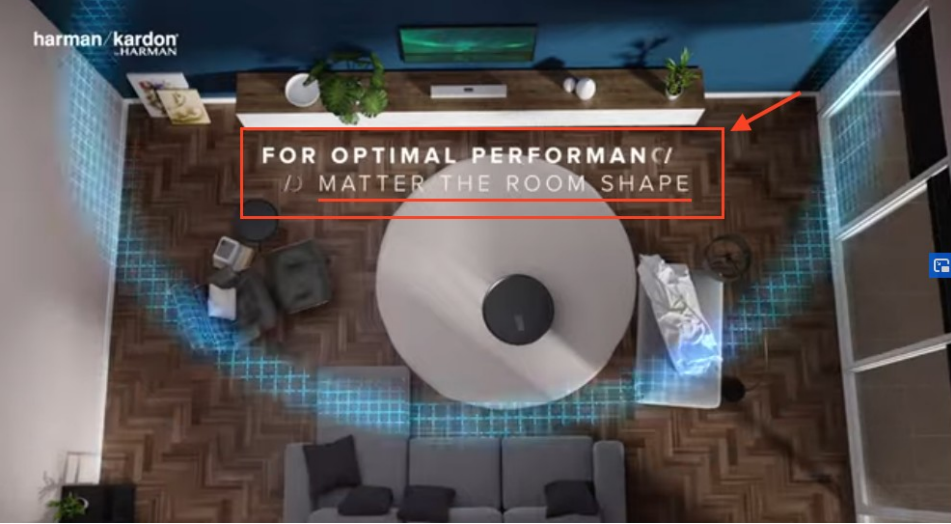
[3]

Additionally, the Citation Multibeam soundbars calibrate for optimal performance depending on the dimensions of the room.




[3]



	 <p>[3]</p>
<p>and wherein the means for applying a time varying audio drive voltage comprises:  at least a first audio source which is offset in time by an amount which is related to the distance between each speaker and the first defined sound target; and</p>	<p>The means for applying a time varying audio drive voltage comprises at least a first audio source which is offset in time by an amount which is related to the distance between each speaker and the first defined sound target.</p> <p>For example, a delay is added to the surround left channel (e.g. first audio source) before it is applied to a speaker on the left-side of the soundbar, as viewed from the listener's position. The delay relates to the distance between the speaker and the surround left location in the nominally sized room, whereby the speaker closest to the surround left location has the most delay. This enables the soundbar to produce audio with a wider soundstage. [A]</p>



	 <p><b>MULTIBEAM™ SURROUND SOUND</b></p> <p>Get a room-filling surround sound effect without the need for extra speakers and wires. <u>MultiBeam™ technology creates a wider soundstage, so you'll hear every audio detail in your favorite music, movies, TV series and games.</u></p>	[3]
<p>at least a second audio source which is offset in time by an amount which is related to the distance between each speaker and the second defined sound target wherein a sum of the first audio source which is offset in time and the second audio source which is offset in time is used to produce the time varying audio drive voltage so that substantially identical sound from the first audio source signal reaches the first sound target at the same time, and substantially identical sound from the second audio source signal reaches the second target at the same time.</p>	<p>The Harman Kardon soundbar includes at least a second audio source which is offset in time by an amount which is related to the distance between each speaker and the second defined sound target. The sum of the first audio source and the second audio source is used to produce the time varying audio drive voltage. Substantially identical sound from the first audio source signal reaches the first sound target at the same time, and substantially identical sound from the second audio source signal reaches the second target at the same time.</p> <p>For example, a delay is added to the surround right channel (e.g. second audio source) before it is applied to a speaker on the right-side of the soundbar. The delay relates to the distance between the speaker and the surround right location, whereby the speaker closest to the surround right location has the most delay. Each speaker is provided, via its amplifier, with a surround left channel signal and a surround right channel signal, each signal having a respective delay. The signals are added together before being input to the respective amplifier. Consequently, each speaker emits a sound wave comprising audio from the surround left channel and</p>	

from the surround right channel, the audio from each channel having an appropriate amount of delay such that the surround left audio reaches the surround left location at the same time as the surround right audio reaches the surround right location. [A]

### Beautiful Sound That Speaks To You

Elegant, dynamic and powerful. The Harman Kardon Citation MultiBeam™ 700 delivers full surround sound to your TV without the need for extra speakers and wires. As a standalone soundbar, it projects rich audio to every corner of the room. When paired with the rest of the Citation range, the Citation MultiBeam™ 700 can also operate as a center channel to create the ultimate home theater setup for full, detailed surround sound. Enjoy more than 300 music streaming services with the convenience of AirPlay and Chromecast built-in™. Plus, with Google Assistant, you can play your favorite music, control volume and get information about the song that you are listening to, hands-free. You can also plan your day, set alarms and control smart devices around your home – just by using your voice. Experience beautiful sound, no matter how you listen.

[4]



[3]

## **Accused Product List**

Citation Bar, Citation Multibeam 700, Citation Multibeam 1100, SB-26

## **References**

[1] Harman Kardon – SB26

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[2] Harman Kardon – SB26 specification sheet

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